

## Distribution of *Diplodia* Blight in France and Determination of Isolates Types

B. THOIRAIN – B. MARÇAIS\* – A. ANDRIEUX – P. FREY – D. PIOUS

UMR 1136 Intéraction Arbres/Micro-organismes, équipe de Pathologie Forestière, INRA Nancy, France

**Abstract** – *Sphaeropsis sapinea* (Fr.:Fr) Dyko & Sutton in Sutton seriously damages *Pinus* spp. throughout the world. The disease strongly emerged in the nineties as a serious problem, mainly on *Pinus nigra* and *P. sylvestris*. By contrast, it was reported as a minor problem in the seventies (Lanier, et al, 1976). The aims of this study were to determine the French distribution of *Sphaeropsis sapinea* and in particular which *Diplodia* species are present in the stands. We also wanted to study factors associated with the pathogen presence.

We studied presence of *S. sapinea* in the stand of European level 1 network, i.e. 73 stands of *P. sylvestris*, *P. nigra* and *P. pinaster* scattered all over France. On each visited plots, crown symptoms on trees were observed, and 10 cones were collected in order to study the frequency of cone colonisation by *S. sapinea* as a measure of the level of the pathogen presence in the stand. *S. sapinea* isolates were obtained from cone scales and were determined to the species using specific PCR primers.

Crown symptoms attributed to *S. sapinea* were recorded in only one plot with *Pinus nigra* in South-western France. In this plot, all pines were infected, with 10 to 100% of crown symptom. For the other plots, the observed crown had less than 10% of crown symptom. Concerning the cone colonisation by *S. sapinea*, the results varied by 0 to 100% of infected cones by stand. The pathogen was detected at least one time on all pine specie studied and was present over all the France, although far less present in SW, on *P. pinaster* and in the Alps.

All fungal isolates of *P. nigra*, *P. pinaster* and *P. sylvestris* were *Diplodia pinea*. Concerning *P. radiata*, we had found the two species, *D. pinea* and *D. scrobiculata*, on Corsica cones, but only *D. pinea* on cones of Metropolitan France. Furthermore, the isolates of the two species were found on the same cone.

We tested the links between the level of pathogen presence and some environmental factors. Some were not linked to the *Sphaeropsis* presence such as stand origin (planted or natural regeneration) and stand age. The best model explaining the *Sphaeropsis* presence in France included the variables pine specie, the rain of summer and the mean of minimum daily temperatures in winter. There was a strong altitudinal effect, *D. pinea* being far less present at higher altitude.

### REFERENCE

LANIER L. – JOLY P. – BONDOUX P. – BELLEMÈRE A. (1976): Mycologie et Pathologie Forestières II. Pathologie forestière. Masson, Paris, ISBN: 2-225-41745-8

\* Corresponding author: marcais@nancy.inra.fr; Nancy, 54280 Champenoux, Fr